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(54) **COORDINATED MEDIA CONTROL SYSTEM**
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345/520; 709/204; 709/220; 709/223

(58) **Field of Classification Search** 370/400,
370/251-271, 235; 345/520; 709/204, 220,
709/223

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,007,046 A 4/1991 Erving et al.
5,058,153 A 10/1991 Carew et al.

5,617,539 A 4/1997 Ludwig et al.
5,689,641 A 11/1997 Ludwig et al.
5,758,079 A 5/1998 Ludwig et al.
5,802,294 A 9/1998 Ludwig et al.
5,844,600 A 12/1998 Kerr
5,848,098 A 12/1998 Cheng et al.
5,884,039 A 3/1999 Ludwig et al.
5,915,091 A 6/1999 Ludwig et al.
6,014,135 A 1/2000 Fernandes
6,078,809 A 6/2000 Proctor
6,128,649 A 10/2000 Smith et al.
6,148,068 A 11/2000 Lowery et al.
6,212,547 B1 4/2001 Ludwig et al.
6,237,025 B1 5/2001 Ludwig et al.
6,300,973 B1 10/2001 Feder et al.
6,327,276 B1 12/2001 Robert et al.
6,532,218 B1 3/2003 Shaffer et al.
6,535,604 B1 3/2003 Provençal et al.
6,560,707 B2 5/2003 Curtis et al.
6,590,604 B1 7/2003 Tucker et al.
6,658,450 B1 12/2003 Balakrishnan et al.
6,690,654 B2 2/2004 Elliott et al.
6,769,013 B2 7/2004 Frees et al.
6,989,856 B2 1/2006 Firestone et al.
7,012,891 B1 3/2006 Chandran et al.
7,024,456 B1 4/2006 Simonoff
7,043,528 B2 5/2006 Schmitt et al.
7,047,279 B1 5/2006 Beams et al.
7,054,904 B2 5/2006 Ludwig et al.

(Continued)

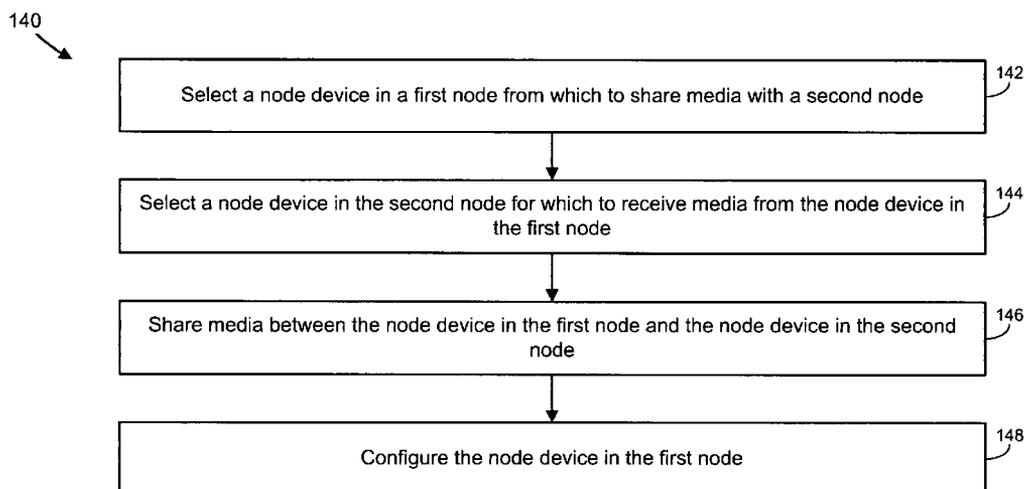
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(57) **ABSTRACT**

A coordinated media control system includes a node manager, a device control system, and a device. The node manager is operatively connected to a first node. The device control system is operatively connected to the node manager. The device is operatively connected to the device control system. The node manager is configured to establish and coordinate media streams for transmitting media from the device to a second node or for receiving media to the device from the second node.

20 Claims, 2 Drawing Sheets



U.S. PATENT DOCUMENTS

7,069,234	B1	6/2006	Cornelius et al.	2005/0198121	A1	9/2005	Daniels et al.	
7,075,919	B1	7/2006	Wendt et al.	2005/0216847	A1	9/2005	Zhu et al.	
2002/0149617	A1	10/2002	Becker	2005/0262201	A1	11/2005	Rudolph et al.	
2003/0120690	A1	6/2003	Schaeffer et al.	2006/0010197	A1*	1/2006	Ovenden	709/204
2003/0158901	A1	8/2003	Ludwig et al.	2006/0041580	A1*	2/2006	Ozdemir et al.	707/102
2003/0187940	A1	10/2003	Ludwig et al.	2006/0059266	A1	3/2006	Ludwig et al.	
2003/0191848	A1	10/2003	Hesselink et al.	2006/0064461	A1	3/2006	Ludwig et al.	
2003/0195994	A1	10/2003	Burgess et al.	2006/0123347	A1	6/2006	Hewitt et al.	
2003/0225832	A1	12/2003	Ludwig	2006/0143295	A1*	6/2006	Costa-Requena et al.	709/227
2004/0103152	A1	5/2004	Ludwig et al.	2006/0161651	A1	7/2006	Ardulov et al.	
2004/0143629	A1	7/2004	Bodin et al.	2006/0187926	A1*	8/2006	Imai et al.	370/389
2004/0215784	A1	10/2004	Qi et al.	2006/0195524	A1	8/2006	Nichols et al.	
2005/0030580	A1	2/2005	Moroi	2006/0195539	A1	8/2006	Nichols et al.	
2005/0044233	A1	2/2005	Cai et al.	2006/0209810	A1*	9/2006	Krzyzanowski et al.	370/356
2005/0055642	A1	3/2005	Chen et al.	2007/0250822	A1*	10/2007	Yang et al.	717/143
2005/0071427	A1	3/2005	Dorner et al.	2007/0266128	A1*	11/2007	Bhagal et al.	709/223
2005/0071440	A1	3/2005	Jones et al.	2008/0031161	A1*	2/2008	Osthus et al.	370/261
2005/0114475	A1	5/2005	Chang et al.	2008/0071834	A1*	3/2008	Bishop	707/104.1
2005/0132299	A1	6/2005	Jones et al.	2008/0137534	A1*	6/2008	Chilukoor et al.	370/232

* cited by examiner

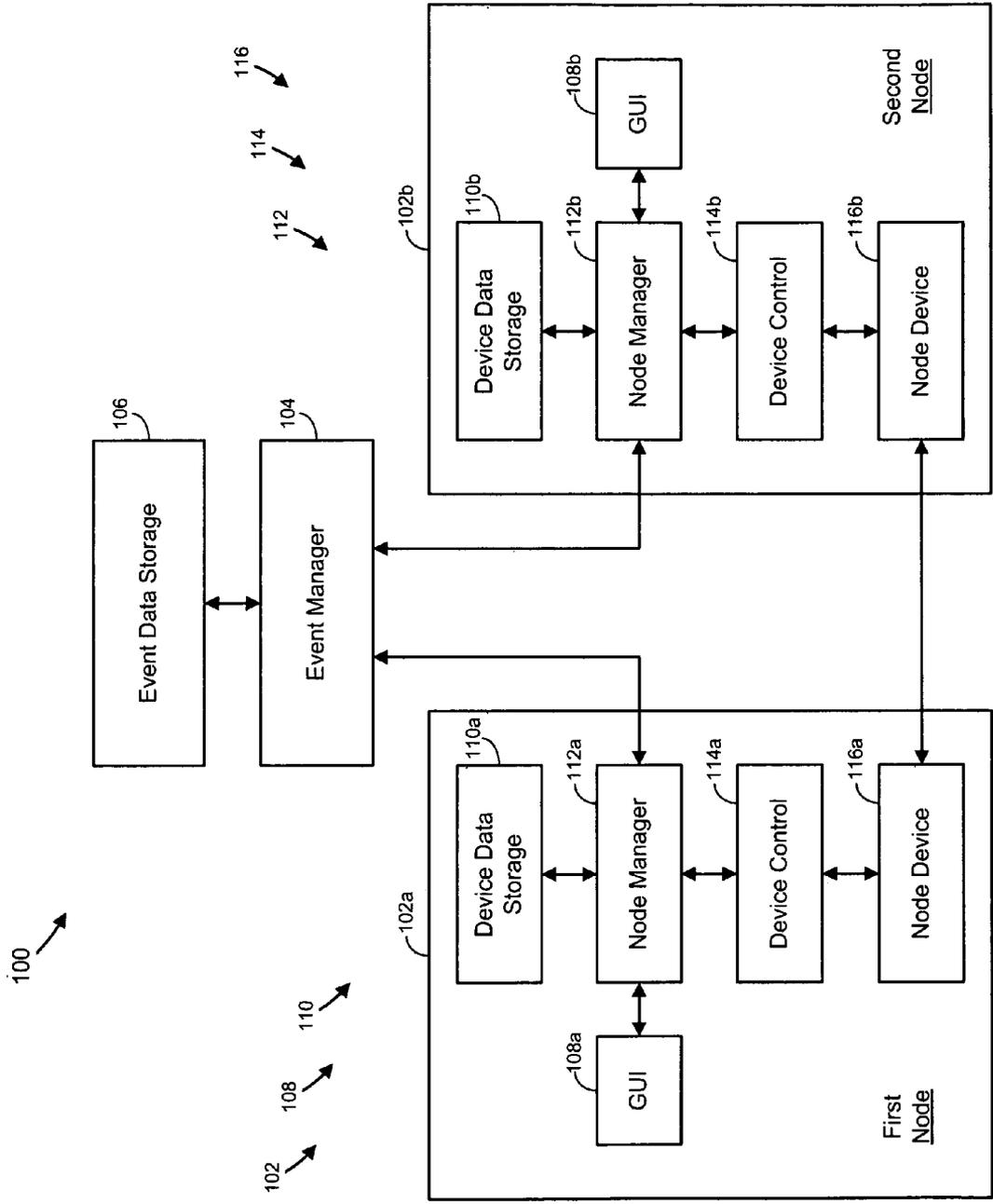


Fig. 1

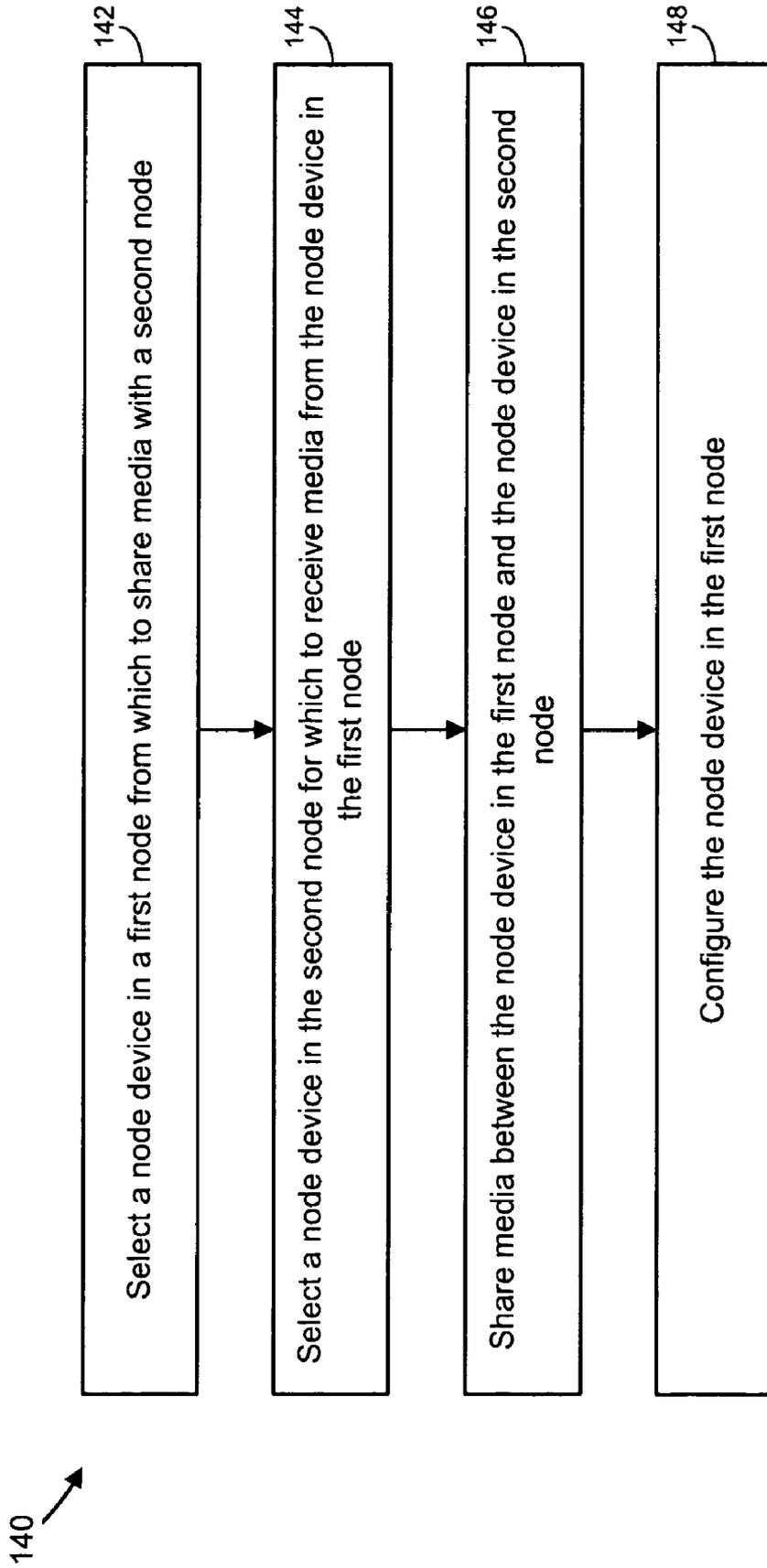


Fig. 2

COORDINATED MEDIA CONTROL SYSTEM

CROSS-REFERENCE TO RELATED
APPLICATIONS

This patent application is related to copending patent application Ser. No. 11/700,331, entitled "Device Control System," filed concurrently with and assigned to the same assignee as the present application, the disclosure of which is incorporated herein by reference.

BACKGROUND

Media devices are commonly used to facilitate communications between remote users. Exemplary media devices include fax machines, video cameras, telephones, printers, scanners, displays, personal computers, microphones, speakers, and other suitable devices for facilitating communications. Each media device typically includes its own interface and control system. Further, different brands and models of the same type of media device may differ in their interface and control systems. The functionality available may also differ even on the same type of media device.

Communications between remote users are typically enhanced by utilizing a plurality of media devices together in a collaborative environment. However, coordinating among the differing interface and control systems of the various media devices can be, amongst other things, complex, time-consuming, and expensive. Having differing interface and control systems can further interfere with the accuracy, expediency and efficiency of the communications process.

For these and other reasons, there is a need for the present invention.

SUMMARY

One embodiment of the invention provides a coordinated media control system. The coordinated media control system includes a node manager, a device control system, and a device. The node manager is operatively connected to a first node. The device control system is operatively connected to the node manager. The device is operatively connected to the device control system. The node manager is configured to establish and coordinate media streams for transmitting media from the device to a second node or for receiving media to the device from the second node.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings are included to provide a further understanding of the present invention and are incorporated in and constitute a part of this specification. The drawings illustrate embodiments of the present invention and together with the description serve to explain the principles of the invention. Other embodiments of the present invention and many of the intended advantages of the present invention will be readily appreciated as they become better understood by reference to the following detailed description. The elements of the drawings are not necessarily to scale relative to each other. Like reference numerals designate corresponding similar parts.

FIG. 1 illustrates a block diagram of a coordinated media control system in accordance with one embodiment.

FIG. 2 illustrates a flow diagram illustrating one embodiment of a method of establishing and sharing a media stream from a first node to a second node.

DETAILED DESCRIPTION

In the following Detailed Description, reference is made to the accompanying drawings, which form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. In this regard, directional terminology, such as "top," "bottom," "front," "back," "leading," "trailing," etc., is used with reference to the orientation of the Figure(s) being described. Because components of embodiments of the present invention can be positioned in a number of different orientations, the directional terminology is used for purposes of illustration and is in no way limiting. It is to be understood that other embodiments may be utilized and structural or logical changes may be made without departing from the scope of the present invention. The following detailed description, therefore, is not to be taken in a limiting sense, and the scope of the present invention is defined by the appended claims.

Embodiments of the invention provide systems and methods for establishing an environment employing a plurality of devices. In one embodiment, the environment is a collaborative environment. In one embodiment, the plurality of devices are locally and remotely coordinated by establishing media stream correspondences between the devices.

As used herein, the term "media" includes text, video, sounds, images, or other suitable digital data capable of being transmitted over a network.

As used herein, the term "node device" includes processor-based devices, input/output devices, or other suitable devices for facilitating communications between remote users. Examples of node devices include fax machines, video cameras, telephones, printers, scanners, displays, personal computers, microphones, and speakers.

As used herein, the term "node" includes any suitable environment or system configured to transmit and/or receive media via one or more node devices. In one embodiment, the environment is a collaborative environment, which enables remote users to share media across one or more node devices. A collaborative environment will enable, for example, a presenter to simultaneously give a multimedia presentation to an audience not only in the presenter's location but also in one or more remote locations. The collaborative environment may further enable the audience in the remote locations to participate in the presentation as the audience in the presenter's location would participate (e.g., ask questions to the presenter).

As used herein, the term "event" refers to a connection of a plurality of nodes such that one or more node devices of one node are configured to transmit media to and/or receive media from one or more node devices of another node.

FIG. 1 illustrates a block diagram of a coordinated media control system 100 in accordance with one embodiment. Coordinated media control system 100 includes a first node 102a, a second node 102b, an event manager 104, and an event data storage 106. First node 102a and second node 102b are collectively referred to as nodes 102. While the illustrated embodiment depicts two nodes 102, coordinated media control system 100 includes any suitable number of nodes 102 in other embodiments.

First node 102a includes a graphical user interface (GUI) 108a, a device data storage 110a, a node manager 112a, a device control system 114a, and a node device 116a. Second node 102b includes a graphical user interface (GUI) 108b, a device data storage 110b, a node manager 112b, a device control system 114b, and a node device 116b. GUI 108a and GUI 108b are collectively referred to as GUIs 108. Device data storage 114a and device data storage 110b are collec-

tively referred to as device data storages **110**. Node manager **112a** and node manager **112b** are collectively referred to as node managers **112**. Device control system **114a** and device control system **114b** are collectively referred to as device control systems **114**. Node device **116a** and node device **116b** are collectively referred to as node devices **116**.

Event manager **104** is operatively connected to event data storage **106** and node managers **112**. Node manager **112a** is operatively connected to GUI **108a**, device data storage **110a**, and device control system **114a**. Node manager **112b** is operatively connected to GUI **108b**, device data storage **110b**, and device control system **114b**. Node device **116a** is operatively connected to device control system **114a** and node device **116b**, which is operatively connected to device control system **114b**. In one embodiment, one or more components of coordinated media control system **100** are operatively connected via one or more suitable computer networks, such as a local area network (LAN) or the Internet. In one embodiment, one or more components of coordinated media control system **100** communicate via one or more suitable network protocols, such as TCP/IP.

In one embodiment, event manager **104** is configured to manage information describing the state of an event. Examples of information describing the state of an event include the identity of nodes **102** and node devices **116** participating in an event, the relationships among nodes **102** and node devices **116**, the intent or manner in which each node **102** and node device **116** is participating, and the capabilities of each node **102** and node device **116**. In another embodiment, event manager **104** is also configured to instruct nodes **102** to operate in accordance with event management policies stored in event data storage **106**.

Event management policies include any suitable conditions or restrictions for creating, executing, and terminating an event. Examples of event management policies include the number of nodes **102** permitted to join an event, the types of nodes **102** permitted to join an event, and data relating to the progress of the event (e.g., duration of an event, available bandwidth). The operation and configuration of event manager **104** is described in greater detail in Ser. No. 11/497,886 entitled "System and Method for Managing Virtual Collaboration Systems," filed Aug. 2, 2006 and assigned to the same assignee as the present application, the disclosure of which is incorporated herein by reference.

Node managers **112** are configured to establish and coordinate media streams for transmitting media between node devices **116**. As illustrated in the embodiment of FIG. 1, node managers **112** operate in accordance with instructions received from attendees via GUIs **108** and in accordance with the event management policies provided by event manager **104**. In one embodiment, GUIs **108** provide a user interface enabling attendees to create, execute, and terminate events between nodes **102**. GUIs **108** include any suitable input/output devices, such as a mouse and a display, for communicating with node managers **112**. In one embodiment, each of node devices **116** further includes its own GUI (not shown).

In one embodiment, GUIs **108** provide attendees with a natural and logical environment for coordinating node devices **116**. In particular, GUIs **108** allow attendees to operate node devices **116** for sharing media streams without the need for specific knowledge of the interface for each node device **116**. For example, if the attendee in first node **102a** desires to share image data recorded from an overhead camera in first node **102a**, the attendee is able to control functions of the camera, such as zoom and focus, through GUI **108a** without the need for specific knowledge regarding the brand or model of the camera. Further, the attendee is unburdened

with the complications of establishing media connections among a plurality of node devices **116** with different interfaces. For example, if an attendee in first node **102a** desires to share image data from an overhead camera in first node **102a** to a display in second node **102b**, the attendee is able to select the overhead camera and the display through GUI **108a**.

In one embodiment, node managers **112** configure and control node devices **116** in accordance with node information stored in device data storages **110**. Node information includes any suitable configuration and control information specific to the particular nodes in which device data storages **110** are located. Examples of node information include the state of the nodes **102** (e.g., online or unavailable), event participation configuration and control data (e.g., the manner and priority in which a node **102** can participate in an event), node device configuration and control data (e.g., command sequences for operating node devices **116**), and user interface data (e.g., the default language of GUIs **108**). In one embodiment, only node manager **112a** or other components within first node **102a** is permitted to access device data storage **110a**. In one embodiment, only node manager **112b** or other components within second node **102b** is permitted to access device data storage **110b**.

In one embodiment, the node information related to first node **102a** and node device **116a** is stored in device data storage **110a** and managed by device control system **114a**. In one embodiment, the node information related to second node **102b** and node device **116b** is stored in device data storage **110b** and managed by device control system **114b**.

In one embodiment, device control systems **114** provide node managers **112** with an abstracted interface to node devices **116**. The control commands are "abstracted" because the user does not need to have specific knowledge (e.g., brand, model, firmware version) of node devices **116** to operate them. Device control systems **114** are described in greater detail in above-reference Ser. No. 11/700,331, entitled "Device Control System," filed concurrently with and assigned to the same assignee as the present application.

FIG. 2 illustrates a flow diagram illustrating one embodiment of a method **140** of establishing and sharing media from (receiving media to) first node **102a** to (or from) second node **102b**. With reference to FIG. 1, using GUI **108a**, an attendee selects (at **142**) a node device **116a** in first node **102a** for which to share media from (or receive media to) node device **116a**. In one example, if the attendee desires to share the image from an overhead camera, the attendee selects a camera icon among a plurality of icons shown on GUI **108a**. The attendee selects (at **144**) a node device **116b** in second node **102b** for which to receive the media from (or to send the media to) node device **116a**. In one example, if the attendee desires for a display to show an image from an overhead camera shared by node device **116a**, the attendee selects a display icon among a plurality of icons shown on GUI **108a**.

The attendee shares (at **146**) the media between the selected node devices **116**. In one example, the attendee selects a share icon among a plurality of icons shown on GUI **108a** to share the media from node device **116a** to node device **116b**. The attendee configures (at **148**) node device **116a**. In one example, the attendee adjusts the focus and zoom of an overhead camera using GUI **108a**. In one embodiment, the attendee configures (at **148**) node device **116** prior to sharing (at **146**) the media. In another embodiment, the attendee configures (at **148**) node device **116** while sharing (at **146**) the media.

Embodiments described and illustrated with reference to the Figures provide systems and methods for coordinated media control. It is to be understood that not all components and/or steps described and illustrated with reference to the

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Figures are required for all embodiments. In some embodiments, at least a portion of the system includes an application comprising program instructions that are tangibly embodied on one or more program storage devices (e.g., hard disk, magnetic floppy disk, RAM, ROM, CD ROM, etc.) and executable by any device or machine comprising suitable architecture, such as a general purpose digital computer having a processor, memory, and input/output interfaces.

Although specific embodiments have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that a variety of alternate and/or equivalent implementations may be substituted for the specific embodiments shown and described without departing from the scope of the present invention. This application is intended to cover any adaptations or variations of the specific embodiments discussed herein. Therefore, it is intended that this invention be limited only by the claims and the equivalents thereof.

What is claimed is:

1. A coordinated media control system comprising:
 - a plurality of nodes, including a first node and a second node, where each of the first node and the second node comprises:
 - a node manager;
 - a plurality of devices that are separate from and different than the node manager and that are communicatively connected to the node manager, where at least some of the devices at the first node are communicatively connected to at least some of the devices at the second node, where the first node enables a user at the first node to select a first device from the plurality of devices of the first node that are communicatively connected to the node manager of the first device and to select a second device from the plurality of devices of the second node that are communicatively connected to the node manager of the second device between which a media stream is to be established; and,
 - an event manager device separate from and different than the nodes and separate from and different than the devices of the nodes, the event manager device communicatively connected to the node manager of each node, wherein the node managers of the first and the second nodes communicate with the event manager device to establish a media stream between the first and the second devices, such that the node managers of the first and the second nodes do not communicate directly with one another to establish the media stream between the first and the second devices,
 - wherein upon the media stream being established via the node managers of the first and the second nodes communicating with the event manager device, the media stream is directly communicated between the first and the second devices without the media stream passing through the event manager device,
 - and wherein communication between the first and the second devices does not pass through any other node and does not pass through the event manager device.
2. The coordinated media control system of claim 1, wherein each node of the plurality of nodes further comprises:
 - a device data storage operatively connected to the node manager and configured to store configuration and control information regarding at least the devices of the node.
3. The coordinated media control system of claim 2, wherein the configuration and control information comprises event participation configuration and control information.

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4. The coordinated media control system of claim 1, wherein each node of the plurality of nodes further comprises:

- a graphical user interface (GUI) operatively connected to the node manager, the GUI configured to enable a user of the node to enter commands to establish and coordinate media streams with other nodes via the event manager device.

5. The coordinated media control system of claim 4, wherein the GUI of each node permits the user to select a given device of the node from the plurality of devices of the node.

6. The coordinated media control system of claim 1, wherein the event manager device is configured to establish media streams among the nodes in accordance with a policy.

7. The coordinated media control system of claim 6, further comprising an event data storage operatively connected to the event manager and configured to store the policy.

8. The coordinated media control system of claim 1, wherein the event manager device is configured to describe a state of each node in accordance with an event.

9. The coordinated media control system of claim 1, wherein each node of the plurality of nodes comprises:

- a device control subsystem separate from and different than the node manager of the node and interconnecting the devices of the node with the node manager of the node, to provide an abstracted interface of the devices of the node to the node manager of the node.

10. The coordinated media control system of claim 1, wherein the devices of each node each comprises one of: a fax machine, a video camera, a telephone, a printer, a scanner, a display, a personal computer, a microphone, and a speaker.

11. A method for establishing and communicating a media stream between a first device of a first node and a second device of a second node of a plurality of nodes, each node having a device, the method comprising:

- receiving, from a user at the first node, selection of the first device from a plurality of devices of the first node and the second device from a plurality of devices of the second node between which the media stream is to be established, the plurality of devices at the first node communicatively connected to a first node manager of the first node and the plurality of devices at the second node communicatively connected to a second node manager of the second node;

- communicating, by each of the first node manager of the first node and the second node manager of the second node, with an event manager device to establish the media stream, where the event manager device is separate from and different than the plurality of devices of each of the first and the second nodes and is communicatively connected to the first node manager of the first node and to the second node manager of the second node, and such that the first and the second node managers of the first and the second nodes do not communicate directly with one another to establish the media stream between the first and the second devices; and,
- communicating the media stream directly between the first and the second devices of the first and the second nodes without the media streaming passing through the event manager device, and where communication between the first and the second devices of the first and the second nodes does not pass through any other node and does not pass through the event manager device.

12. The method of claim 11, further comprising permitting a user to establish and coordinate the media stream between

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the first node the second nodes via a graphical user interface (GUI) at each of the first and the second nodes.

13. The method of claim **11**, wherein the event manager device is configured to establish media streams among the nodes in accordance with a policy.

14. A node of a coordinated media control system, comprising:

a plurality of devices, at least some of which are communicatively connectable to other devices of other nodes of the coordinated media control system, where the node enables a user at the node to select a first device from the plurality of devices of the node and to select a second device from the plurality of other devices of the other nodes between which a media stream is to be established; and,

a node manager to communicate with an event manager device separate from and different than the node and the other nodes of the coordinated media control system, to establish a media stream between the first and the second devices, the devices of the node being communicatively connected to the node manager

such that the node manager of the node does not communicate directly with a node manager of the given other node to establish the media stream,

wherein upon the media stream being established, the media stream is directly communicated between the first and the second devices without the media stream passing through the event manager device,

wherein the devices are separate from and different than the node manager,

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and wherein communication between the first device and the second device does not pass through any other node and does not pass through the event manager device.

15. The node of claim **14**, further comprising a device data storage operatively connected to the node manager and configured to store configuration and control information regarding at least the devices of the node.

16. The node of claim **15**, wherein the configuration and control information comprises event participation configuration and control information.

17. The node of claim **14**, further comprising a graphical user interface (GUI) operatively connected to the node manager, the GUI configured to enable a user of the node to enter commands to establish and coordinate media streams with the other nodes via the event manager device.

18. The node of claim **17**, wherein the GUI permits the user to select the first device of the node from the plurality of devices of the node.

19. The node of claim **14**, further comprising a device control subsystem separate from and different than the node manager of the node and interconnecting the devices of the node with the node manager of the node, to provide an abstracted interface of the devices of the node to the node manager of the node.

20. The node of claim **14**, wherein the devices of the node each comprises one of: a fax machine, a video camera, a telephone, a printer, a scanner, a display, a personal computer, a microphone, and a speaker.

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,911,955 B2
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DATED : March 22, 2011
INVENTOR(S) : Mark E Gorzynski et al.

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In column 6, line 44, in Claim 11, delete “node and” and insert -- node, and --, therefor.

Signed and Sealed this
Twenty-eighth Day of June, 2011

A handwritten signature in black ink that reads "David J. Kappos". The signature is written in a cursive style with a large initial "D".

David J. Kappos
Director of the United States Patent and Trademark Office